

MACHINE SCREWS, NUTS AND BOLTS

This mobile revision pdf is based on detailed work found in the 'RESISTANT MATERIALS' section. Tap on the green link button below to go to the complete website section



Tap the blue button to view equipment / processes covered by this Revision PDF



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MACHINE SCREWS, NUTS AND BOLTS

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MACHINE SCREWS - MATERIALS

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The titanium screws shown below, have been manufactured for the aerospace industry, where the strength to weight ratio must be high. Machine screws are also manufactured from stainless steel, carbon steel, brass and even copper. Steel screws tend to be zinc plated to prevent corrosion. Anodising, which means a vast range of colours can be used.

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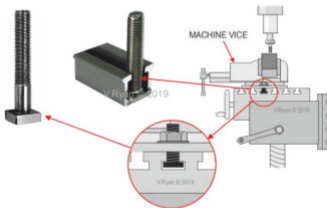


T HEAD BOLT

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Used when there is a need to bolt a device such as a machine vice to a milling machine table, ready for machining. In this example, T Bolts are used to secure the machine vice. T Bolts have many over applications. Follow the links to discover more uses.

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COUNTERSUNK MACHINE SCREWS

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This countersunk screw is ideal when the machine screws head must to level for the surface of the material. Machine screws are available with almost every description of head, such as slot head and hex head.

The serrated jaws of the machine vice (below), are held in position by a countersunk machine screw, with a cross head / phillips® head.

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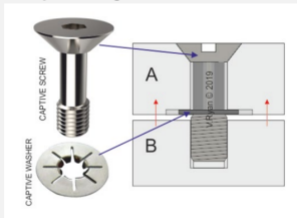


CAPTIVE SCREW - HEX SOCKET

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Captive screws cannot be removed fully, when loosened. When being fitted, the screw is placed through the first metal section (A) and then the washer. The screw can be threaded through the washer BUT not withdrawn / unscrewed. The threaded portion of the screw is then tightened into the threaded hole of the second section of material (B)

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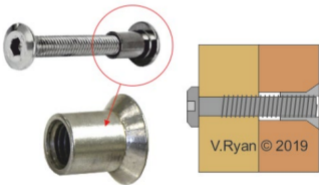


BARREL NUT AND BOLT

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These machine bolts are primarily designed for knock down furniture and similar products. The head of the bolt is normally a 'hex socket' allowing the use of an allen key. They often have a chrome finish, especially when they will be seen, when the product is assembled.

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DOUBLE ENDED THREAD STUD BOLT

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These stud bolts are useful when there is a need to use a 'nut' on either side of the material(s) being fastened together.

In the example shown here, one of the 'nuts' would be held in positive by a spanner, whilst the opposite nut would be tightened with a second spanner.

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TOGGLE BOLT

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Used in the construction industry. The wings open out when inserted inside a hollow such as a wall cavity. The bolt can then be tightened.

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HOOK BOLT

Hook bolts are used in the construction industry and have a range of DIY applications.

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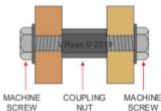
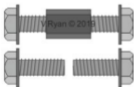


COUPLING NUT

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A coupling nut is useful when there is a need to join two machine screws or two threaded bars. One such practical application is seen below. Two materials are joined together, but the coupling nut acts a spacer between the materials.

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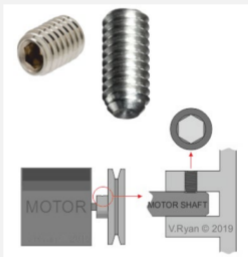
GRUB SCREW / SET SCREW

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Ideal when the 'machine screw' must be below the surface of the material. Grub screws are either slot head or hex head. A motor is shown below. It powers a shaft and on to the shaft is a pulley wheel. The pulley wheel is held in position by a 'grub' screw. An Allen Key is used to remove the grub screw

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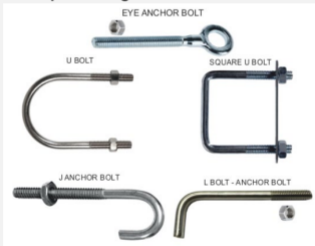


ANCHOR BOLTS

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Some Anchor Bolts are shown below. They have a variety of applications and tend to be used widely in the construction industry. One common use is in the fastening of TV Aerials and Satellite Dishes to walls and chimneys. Workshops sometimes use them to suspend equipment from ceilings.

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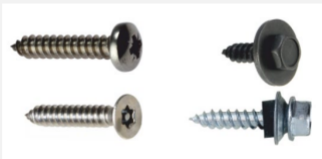


SELF TAPPING SCREWS

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These are very useful screws when joining thin sheet metal. If the correct size hole is drilled in the sheet metal (slightly smaller than the diameter of the screw), as the screw is turned, it cuts through the thin metal, forming an internal thread, in a similar way to a 'tap'. They are only capable of producing a thread on thin sheet metal. Available in a variety of 'head' forms.

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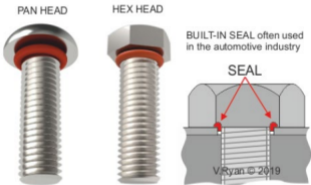


INTEGRAL SEAL SCREWS

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These specialist machine screws are used in the automotive industry, when a seal is required, such as with engine components. When the screw is tightened, the 'rubber' seal prevents pressurised fluid or gas escaping.

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ALLEN BOLTS

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Allen bolts are very common. They have the advantage that the Allen Key (also called a 'hex key'), provides a 'handy' lever, when the bolt is being tightened or loosened. They are available in a range of sizes and head types.

The hex / allen key is manufactured from a steel alloy such as Chrome Vanadium Steel

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WING NUTS

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Wing nuts are used when there is only a need to hand tighten. They are useful when a product, such as flat packed furniture, may need assembling and disassembling at a later date. An additional tool such as a spanner is not required.

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PEARL M-8W/2 WING NUT



SPECIFICATION DIN 315 AF



AMERICAN FORM



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HANDLE WING NUTS

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Handle wing nuts are ergonomically designed, to be more comfortable in the hand. They sometimes provide more leverage, due to their larger size. They are normally found with equipment that needs regular adjustment, such as a camera or telescope tripod.

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ANTI THEFT MACHINE SCREWS, NUTS AND BOLTS

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These machine screws are used when security and safety is utmost. A spanner is used to tighten the 'hex' portion of the nut.

When it reaches a certain torque, the hex portion breaks away from the fastener, which is firmly fixed in position.

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NYLON MACHINE SCREWS, NUTS AND BOLTS

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Nylon nuts and bolts are often used in corrosive environments, where a metallic equivalent would corrode over time. Nylon can be manufactured in almost any colour. Nylon is an insulator and does not conduct electricity. Therefore, nylon machine screws, nuts and bolts are often used for the assembly of electrical devices.

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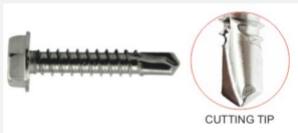
SELF DRILLING MACHINE SCREWS

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This unusual machine screw has a 'drill' type tip, to the screw portion. It is capable of joining metal to metal, up to 3.5mm thickness. Self cutting machine screws have a special 'hardened' tip, which also cuts a thread in the metal (see diagram of 'cutting tip').

They are used when speed is of the essence and are being used increasingly in the construction industry.

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DOME NUTS

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Supplied with most machine screws / bolts are nuts, to lock the bolt in position. They are supplied in a range of types and sizes. Dome nuts are regarded as both functional and decorative. They are often chromed as a finish or are manufactured from brass or stainless steel.

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HEX NYLON LOCK NUT

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Lock nuts are used when it is vital that the 'nut and bolt', does not rattle loose.

Some have a nylon insert, that the machine screws thread cuts into when being tightened. The nylon provides and necessary friction required to prevent 'loosening' on the nut.

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SELF LOCKING LOCK NUT WITH BUILT IN FRICTION RING

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These have a built-in friction ring, which provides the necessary friction required to prevent 'loosening' on the nut.

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CASTLE NUT AND SPLIT PIN

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A Castle nut and Split Pin can be used to 'lock' a 'nut' in place, as shown in the diagram below. The split pin pushes through a hole in the bolt and is deformed through the castle nut, preventing it from loosening.

Tap the images for more information

SPLIT PIN



SPLIT PIN IN PLACE
LOCKING THE BOLT
AND CASTLE NUT
TOGETHER



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PLAIN WASHER

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Washers for machine screws and bolts provide the surface on which the nut or head of the bolt are tightened. When tightened, the force applied to the bolt / nut is distributed evening across the area of the washer. This prevents the area around the head of the bolt and nut from being damaged.

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CUP WASHER

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These are used in conjunction with countersunk screws (wood screws and machine screws). The machine screw head fits neatly into the cup, providing a professional finish. They are often decorative and can be seen on knockdown furniture and are often brass or chrome finished.

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SPRING WASHER (LOCKING WASHER) AND STAR WASHER

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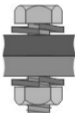
A spring washer is designed to prevent a nut from loosening. The 'spring' exerts a force against the bolt head / nut, making it less likely that the nut and bolt will loosen. A star washer has the same function, in that it helps to prevent nuts and bolts becoming loose, through vibration or shaking.

Tap the image for more information

SPRING WASHER
(LOCKING WASHER)



STAR WASHER



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RUBBER FLUTED WASHER

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A rubber fluted washer provides a waterproof seal for exterior work, such as felting a shed room, when roofing screws are used. The example opposite, shows the rubber fluted washer 'compressed' under the force applied through the screw, creating a seal.

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